Silent Invaders Teacher Guide and Vocabulary List

State Standards: SC.F.1.4, SC.G.1.4, SC.G.2.4, SC.H.1.4, SC.H.2.4, SC.H.3.4

Silent Invaders PowerPoint™ **–** This 50-slide presentation is a basic introduction to aquatic and terrestrial plants found in Florida along with the concept of ***native***, ***non-native*** and ***invasive*** plant species. Learn the difference between the three and how some non-native, invasive plants are impacting our waterways, lakes, rivers, wetlands and upland natural areas. The lesson ends with positive actions we can all take to help prevent the spread of invasive plants in our own neighborhoods. Includes viewing/discussion questions and answers, and vocabulary.

Provide discussion questions to students to use while they're watching the PowerPoint.™ Answers can be checked at the end of the presentation as part of the discussion. Vocabulary words are provided at the beginning of PPT.

Silent Invader Slide Locator

Slide 1 – 6	Introduction and vocabulary words
Slide 7 – 8	Definition and examples of terrestrial plants
Slide 9-11	Definition and examples of aquatic plants
Slide 12-14	Definition and examples of native plants
Slide 16-22	Definition and examples of non-native plants
Slide 24-25	Problems related to some non-native plants in Florida
Slide 27-29	Ecological consequences of non-native invasive plants
Slide 32 - 33	Definition of invasive plants.
Slide 34-38	Specific problems related to invasive plants
Slide 39-41	Identification of native and invasive plants
Slide 42-49	Actions to help prevent invasive plants
Slide 50	Young people enjoying natural Florida
Slide 52	Reference website
Slide 53	Discussion questions

Unfortunately, almost every place on earth is being invaded by plants from other places. Our "coontail" plants are invading South Africa. Southeast Asia's hydrilla is invading the U.S. Our native and desirable tape grass is an unwanted invader of Australia's rivers. Old world torpedo grass is growing wildly across Florida, and we're finding it very difficult to manage.

ATTENTION UPPER ELEMENTARY teachers:
Due to the length of this presentation, we recommend it be shown in segments.

Slides 1 – 14 -- general introduction to native plants in Florida

Slides 16 – 31 -- introduction to concept of non-native plants
Slides 32 – 41 -- introduction to concept of invasive plants
Slides 42 – 50 -- positive actions to take

BACKGROUND INFORMATION

There are thousands of species of plants in the United States, with more than 4,000 known to be in Florida. Most plants in Florida's wild areas are native terrestrial plants (plants that live on dry land)**.** But Florida is also home to hundreds of native plants that live in damp to wet soils, and even underwater. Together, they total about 3000 native plant species (http://plants.ifas.ufl.edu/guide/natplant.html). The ***Native Freshwater Plants*** photo-murals depict just a few of Florida's native freshwater wetland and aquatic plants (http://plants.ifas.ufl.edu/mural2.html).
For names/photos of native plants in your region: http://plants.ifas.ufl.edu/education/regional_map.html .

NATIVE Plants

Native plants have evolved within their own ecological niches, and are not invasive within their own native ranges. Native plants provide food and shelter to our animals of all sorts, stability to our shorelines and fields, and visual pleasure of the highest order. Because a **native** plant species usually does not take over its home range, there is biodiversity -- a number of species growing in balance and living together in harmony. Florida is famous for its biodiversity. Biodiversity exists when species are constrained in their growth by natural factors, so they can't overrun their neighboring species. Such natural growth restraints include: competition with other native species, diseases, feeding by insects and other animals, climate, and so on.

A collaboration of the UF/IFAS Center for Aquatic and Invasive Plants and
the Department of Environmental Protection, Bureau of Invasive Plant Management
MS/EA 2/17/07

By definition, **native plants are not invasive**. However, sometimes, when a habitat or site becomes "disturbed," (i.e., from construction, digging, or when water level fluctuations have been altered by man-made drainage or pumping systems, or when excessive amounts of fertilizer enter the water body), then certain native plants have been known to cause problems. Our native cattails (*Typha* species) are famous for quickly filling in wet areas that have been disturbed or altered. They are often the dominant plant in man-made ponds and ditches. In the Everglades, for example, cattails are crowding out the desirable saw-grass (*Cladium jamaicense*), which produces food and shelter for native Everglades' animals. It is believed that man-made alterations in water level fluctuations as well as nutrient
input have given an advantage to cattail over saw-grass in certain areas. For the most part though, native plants are in balance with their environment.

NON-NATIVE Plants

Of the more than 4,000 plant species in Florida, perhaps 1,000 species or more (25%) are **non-native**; they're also referred to as "exotic." We define **non-native** plants as "**those that have become part of the Florida flora following the occupation by European man."** In other words: plants that were introduced after the year 1513 are considered non-native. *(Source: Richard P. Wunderlin, © 2006 Institute for Systematic Botany)*

The term **non-native** usually refers to plants from other countries, regions or continents; kariba weed (*Salvinia molesta*) probably comes from Brazil, and Brazilian pepper (*Schinus terebinthifolius*) comes from South America, etc. However, the term can also apply to plants from another region (i.e., within the same country). An example: smooth cordgrass (*Spartina alterniflora*), a native desirable plant on the U.S. Atlantic coast is invasive on the Pacific coast, covering oyster beds and other vital habitat.

Attn MS and HS teachers: For more information see "Their Plants Invade Here; Our Plants Invade There" article. (http://plants.ifas.ufl.edu/aq-s01-5.html)

Not all non-native plants are problematic. A wide variety of agricultural plants, such as tomatoes, citrus trees and other "economic crops" in Florida are obviously "good" and essential to human health and our economy. These plants are well managed by the farmers who plant them and sell their valuable products. Rarely do our non-native food crops spread as weeds. (As far as we know, there aren't any forests being threatened by tomato plants.) Some ornamental non-native plants (roses, tulips, poinsettias, caladiums, etc.) also are benign. Genetics, climate, soil, disease, insects prevent some cultivated plants from being able to spread on their own; they simply will not survive unless humans take care of them. As a result, they generally don't cause any significant problems in the wild. Therefore, we have little to worry about when it comes to certain non-native plants that will not spread "on their own."

INVASIVE Plants: What's the problem?

Under the right conditions, some non-native plants can become **invasive**. An **invasive plant is a non-native plant species that has escaped cultivation, is spreading on its own and causing environmental or economic harm.**

Invasive non-native plants can outgrow, replace, and otherwise destroy our native plants. That's because non-native plants usually do not have their natural enemies -- the diseases, insects and other environmental stresses -- that keep them in check in their native ranges. The destruction and replacement of our native plants has several significant consequences:

- Our natural biodiversity is destroyed;
- Our native plants can be eliminated;
- Our wildlife have evolved to use native plants are not able to make use of non-native plants. As a result, they leave the area or die off;
- invasive plants can completely fill the water column or cover the surface so that fish are driven from the area;
- swimming, boating, hiking and other uses can be affected or even dangerous in areas with invasive plants.

For photographic depictions of some of the least desirable (invasive) plants now found in Florida and elsewhere see the ***Invasive Non-Native Plants*** murals (http://plants.ifas.ufl.edu/mural2.html) or our website, which features over 500 plant species http://plants.ifas.ufl.edu/plants&animals.html.

How Do Non-Native Plants Get Here?

Non-native plants find there way here through a variety of ways. Any of us could have accidentally introduced them:

- as seed and plant contaminants in imported nursery plants and soils;
- as misidentified/unknown plants sold to/by aquarium keepers, water gardeners, landscapers and friends;

UNIVERSITY OF FLORIDA IFAS EXTENSION
A collaboration of the UF/IFAS Center for Aquatic and Invasive Plants and
the Department of Environmental Protection, Bureau of Invasive Plant Management
MS/EA 2/17/07

- as whole plants and growing fragments in ballast water in foreign ships coming to our ports;
- on those fruits and flowers you brought home in your vacation luggage;
- and as hitchhikers on boat trailers, props, dive gear, or in bait wells.

In the past, some species were purposefully introduced to "improve" our natural areas. For example, melaleuca trees (*Melaleuca quinquenervia*) were introduced to Florida from Australia by spreading their seeds from airplanes over the Everglades. At the time, land managers wanted the trees to suck up the “excess” water and make the Everglades more “suitable” for human use while providing a source of wood. The plan resulted in millions of invasive melaleuca trees covering half a million acres which are now known to be destructive to Florida's endangered Everglades environment and animals. Melaleuca trees now are being removed at a huge expense.

How Do Plants Spread?

Plants reproduce and spread by several means. All flowering plants produce seeds – some even grow flowers and are pollinated under water, like the naiads. Depending on the plant, its location and other circumstances, plants may spread when:

- their seeds are dispersed by wind, water, or birds and other animals;
- vegetative “propagules" fall off and form new plants;
- the plant is somehow fragmented (such as by a boat propeller) and the plant parts re-grow into new plants;
- yard waste is taken elsewhere;
- the root system expands and gives rise to new plants.

Managing Invasive Plants

Undeniably, there are other non-native plants already introduced to Florida that someday will be invasive weeds. We don't want to continue to allow destructive species into the state. The question is, "How far on the side of safety should state regulatory agencies go in *NOT* permitting the importation, growing or selling of non-native plants?"

One of the most difficult things an eco-management agency can do is predict, before hand, which non-native plants might become terribly invasive on their own, and which non-native plants would be benign. That's why there sometimes are controversies between government agencies and plant growers or importers. A grower may say there is not enough evidence to show that a plant would be invasive while the governing agencies might feel there is a legitimate reason to prohibit a plant from entry into the state.

To that end, the University of Florida/Institute of Food and Agricultural Sciences (IFAS) has developed a working group of scientists that provide consistent recommendations concerning the use of non-native plants in Florida. The Assessment and the Working Group were created in response to the growing awareness of the threat posed (especially to threatened and endangered species) by non-native invasive species. For more information: http://edis.ifas.ufl.edu/AG100 and http://plants.ifas.ufl.edu/assessment/ .

The Florida Exotic Pest Plant Council (**FLEPPC)** is a volunteer organization of plant management professionals who also assesses the threat of Florida's non-native plants and then categorizes them according to their invasiveness. It defines Category I plants as "invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives." As of 2006, there are at least 125 non-native invasive plants that meet that criterion in Florida.

As is now well known, some nursery-sold and pet-store-sold plants are invasive or are believed by scientists to have the high potential to become invasive: plants such as certain bamboo and grass species, certain tree and vine species, certain aquatic species, and others.

One invasive plant, the Chinese tallow tree (*Sapium sebiferum*), a very pretty shade tree, is an example of an invasive tree that was sold widely before it was discovered to be taking over some of Florida's wetlands. For example, thousands of Chinese tallow trees have spread on their own is Paynes Prairie State Park near Gainesville; the trees are so plentiful that lots of money and labor is now required to destroy them.

Another invasive non-native plant is hydrilla (*Hydrilla verticillata*). It was introduced as an aquarium plant and sold in stores. Hydrilla grows very well, now infesting tens of thousands of acres in Florida public waters. It has also spread to nearly 20 states as far away as Massachusetts and California. Hydrilla requires constant management with chemicals and machines; management costs in Florida public waters for this single plant species approach $20 million every year.

Invasive non-native plants must be controlled; ignoring them is not an option. Because it's unlikely that an established non-native plant species can be eradicated from natural areas, we often have to settle for the goal of "maintenance control." This means using all appropriate tools to “control” or keep the plants at the lowest level possible while conserving or enhancing native plants.

There are several control methods used to achieve maintenance control, depending on the plant and habitat:

Chemical control (http://plants.ifas.ufl.edu/guide/herbcons.html) is the use of specially formulated herbicides (registered with the U.S. EPA and the Florida Department of Agriculture and Consumer Services) to kill plants.

Biological control (http://plants.ifas.ufl.edu/guide/biocons.html) is the use of imported insects, fish and other organisms which eat or infect or otherwise keep the invasive plants at low levels indefinitely. Before releasing such organisms, the USDA and the Florida Department of Agriculture and Consumer Services must verify that insect biocontrols have proven to be host-specific.

Mechanical control (http://plants.ifas.ufl.edu/guide/mechcons.html) is the use of specially-made machines to "harvest" invasive plants by cutting and collecting them and transporting them to a place to decompose.

Physical control includes using hands, drawdowns (water removal), flooding, burning, dredging and shading to control invasive plants. Integrated control is the use of two or more of the above methods.

STEWARDSHIP: WHAT CAN WE DO?

- ☐ When buying plants, choose a legitimate nursery, and confirm that the vendor is aware of what species are restricted, both regionally and federally. Be sure to verify the correct plant identification and common names. For aquatic plants, rinse them in a bucket of tap water to remove unwanted sediments and/or bugs.
- ☐ When disposing of plants that have the potential of spreading into nearby woods or waterbodies, completely dry or freeze the plants to kill them, and then add them to household garbage that will not be composted. Incineration is another possible alternative. (burning in your backyard trash can is not hot enough to kill some seeds).
- ☐ Learn how to identify invasive non-native plants, as well as our native plants. It's not so difficult to learn a few plants that are interesting or important to you.

Vocabulary

1. **Aquatic plants** – plants that live near, on, or under the water.
2. **Emersed plants** – have roots underwater with part of the plant sticking above the water.
3. **Floating-leaved plants** – plants that have leaves that float on the surface; roots are not always anchored to the bottom.
4. **hydrilla** – a submersed aquatic plant that is extremely invasive in Florida lakes and rivers.
5. **Invasive plants** – non-native plants that spread on their own and cause environmental or economic harm.
6. **Native plants** – plants that were here before Columbus arrived to the New World.
7. **Natural areas** – lands that have not been developed for agriculture, business or housing.
8. **Non-native plants** – (In Florida) a plant species that arrived since the time of Columbus.
9. **Submersed plants** – grow with their roots, stem and leaves completely underwater.
10. **Terrestrial plants** – live on dry land.
11. **Water hyacinth** – a floating aquatic plant from South America that is invasive in Florida and many other regions of the world.

UNIVERSITY OF FLORIDA IFAS EXTENSION
A collaboration of the UF/IFAS Center for Aquatic and Invasive Plants and
the Department of Environmental Protection, Bureau of Invasive Plant Management
MS/EA 2/17/07